

### Claim

1. A muffler and catalytic converter device receiving exhaust from an engine comprising:  
an outer shell;  
5 at least one baffle placed inside said shell;  
wherein said at least one baffle is made from porous metal having a plurality of pores  
and having a pore density between 80% and 98%; and  
wherein said pores having diameters between 50 $\mu$ m and 1200 $\mu$ m.

10 2. The muffler and catalytic converter device of claim 1 wherein the diameters of said  
pores is between 400 $\mu$ m and 800 $\mu$ m and said pore density is between 95% and 98%.

3. The muffler and catalytic converter device of claim 1 wherein said porous metal is at  
least one metal selected from the group consisting of: nickel, iron, and titanium.

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4. The muffler and catalytic converter device of claim 1 wherein said porous metal is a  
metal alloy containing at least two components A and B;

wherein said A component is between 55 wt% and 95 wt% of said porous metal and is  
at least one metal selected from the group consisting of: nickel, iron, and titanium; and said B  
20 component is between 5wt.% and 45 wt.% of said porous metal and is at least one element  
selected from the group consisting of: chromium, aluminum, cobalt, molybdenum, and zinc.

5. The muffler and catalytic converter device of claim 1 wherein the volume of said muffler and catalytic converter device is 0.3 times to 7 times the displacement of said engine.

6. The muffler and catalytic converter device of claim 1,

5 wherein said baffle has a layer of catalyst coating;

wherein the composition of said catalyst coating comprises of an active ingredient, an assisting ingredient, and a stabilizer;

wherein said active ingredient is at least one rare earth metal selected from the group consisting of: cerium, lanthanum, praseodymium, and neodymium, and at least one precious

10 metal selected from the group consisting of: palladium, platinum, rhodium, and ruthenium;

wherein said assisting ingredient is at least one element selected from the group consisting of: manganese, calcium, barium, magnesium, zinc, and aluminum; and

wherein said stabilizer is at least one element selected from the group consisting of: zirconium, potassium, sodium, and lithium.

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7. The muffler and catalytic converter device of claim 1 having a plurality of baffles and receiving exhaust from an intake pipe and expelling said exhaust from an outtake pipe;

wherein said outer shell has an intake opening and an outtake opening;

wherein said intake opening is connected to said intake pipe and said outtake opening

20 is connected to said outtake pipe;

wherein said exhaust flows into said shell from said intake pipe and exits said shell from said outtake pipe;

wherein the direction of exhaust flow is from said intake opening to said outtake opening;

wherein at least one baffle of predetermined thickness is placed across the direction of exhaust flow;

5 wherein at least two of said baffles are separated by a first gap of predetermined thickness; and

wherein at least one said baffle is separated from an inner surface of said outer shell by a second gap of predetermined thickness.

10 8. The muffler and catalytic converter device of claim 7 having two baffles;

wherein the sum of the number of said first gaps and the number of said second gaps is three; and

wherein the ratio of the thickness of said three gaps are 1: between 1 and 10: between 1 and 2.

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9. The muffler and catalytic converter device of claim 7 having between 3 and 6 baffles wherein the sum total of the number of said first gaps and the number of said second gaps is between 4 and 7.

20 10. The muffler and catalytic converter device of claim 7 wherein the thickness of said baffles is between 10 mm and 100mm and the thickness of said first and second gaps is between 10mm and 150mm.

11. The muffler and catalytic converter device of claim 1 having a plurality of baffles and receiving exhaust from an intake pipe and expelling exhaust from an outtake pipe;

wherein said outer shell has an intake opening and an outtake opening;

wherein said intake opening is connected to said intake pipe and said outtake opening

5 is connected to said outtake pipe;

wherein said exhaust flows into said shell from said intake pipe and exits said shell from said outtake pipe;

wherein the direction of exhaust flow is from said intake opening to said outtake opening;

10 wherein at least one baffle of predetermined thickness is placed along the direction of exhaust flow;

wherein at least two of said baffles are separated by a first gap of predetermined thickness; and

wherein at least one said baffle is separated from a surface of said outer shell by a  
15 second gap of predetermined thickness.

12. The muffler and catalytic converter of claim 11 wherein the thickness of said baffles is between 10 mm and 100mm and the thickness of said first gaps and said second gaps is between 5mm and 20mm.

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13. The muffler and catalytic converter device of claim 1 wherein at least one said baffle is spiral shaped.

14. The muffler and catalytic converter of claim 13 wherein the thickness of said baffles is between 1mm and 5mm.

15. A muffler, comprising:

an outer shell;

at least one baffle of sound absorption material is placed inside said shell;

wherein said baffle is made from porous metal having a plurality of pores and having a pore density between 80% and 98%; and

wherein said pores having diameters between 50 $\mu$ m and 1200 $\mu$ m.

16. The muffler of claim 15 wherein said porous material is at least one metal selected from the group consisting of: nickel, iron, and titanium.

17. The muffler of claim 15 wherein said porous metal is a metal alloy containing at least two components A and B;

wherein said A component is between 55 wt% to 95 wt% of said porous metal and is at least one metal selected from the group consisting of: nickel, iron, and titanium and said B component is between 5wt.% to 45 wt.% of said porous metal and is at least one element selected from the group consisting of: chromium, aluminum, cobalt, molybdenum, and zinc.

18. A catalytic converter, comprising:

an outer shell;

at least one baffle placed inside said shell;

said baffle is a substrate for at least one layer of catalyst coating;

wherein said baffle is made from porous metal having a plurality of pores and having a pore density between 80% and 98%; and

wherein said pores having diameters between 50 $\mu$ m and 1200 $\mu$ m.

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19. The catalytic converter of claim 18 wherein said porous material is at least one metal selected from the group consisting of: nickel, iron, and titanium.

20. The catalytic converter of claim 18 wherein said porous metal is a metal alloy

10 containing at least two components A and B;

wherein said A component is between 55 wt% to 95 wt% of said porous metal and is at least one metal selected from the group consisting of: nickel, iron, and titanium and said B component is between 5wt.% to 45 wt.% of said porous metal and is at least one element selected from the group consisting of: chromium, aluminum, cobalt, molybdenum, zinc,  
15 zirconium, vanadium, lanthanum, and neodymium.

21. The catalytic converter of claim 18,

wherein the composition of said catalyst coating comprises of an active ingredient, an assisting ingredient, and a stabilizer;

20 wherein said active ingredient is at least one rare earth metal selected from the group consisting of: cerium, lanthanum, praseodymium, and neodymium, and at least one precious metal selected from the group consisting of: palladium, platinum, rhodium, and ruthenium;

wherein said assisting ingredient is at least one element selected from the group consisting of: manganese, calcium, barium, magnesium, zinc, and aluminum; and

wherein said stabilizer is at least one element selected from the group consisting of: zirconium, potassium, sodium, and lithium.